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# PRODUCTION

THE MAGAZINE OF MANUFACTURING MANAGEMENT



A PRODUCTION Round Table

## Facing Up to the Issues of Quality...52

Stamping Cashes in on Change

Down-to-Earth Management at Bendix

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Cover illustration by Kim Fujiwara.

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# Think Software

*Looking for a CAE/CAD/CAM system? One market researcher thinks that you should look beyond the hardware to the software. That's where the action is—and where the real work is done.*

**By Gary S. Vasilash**

*Executive Editor*

"OVER THE LAST DECADE THE GROWTH of the mechanical computer-aided engineering/computer-aided design, and computer-aided manufacturing (CAE/CAD/CAM) market has been explosive. In 1988 more than \$4.5 billion of hardware and software was purchased. Today, there are over 100 vendors marketing mechanical CAE/CAD/CAM systems. With so many vendors and product alternatives, the typical buyer has a difficult time identifying the leading vendors and sorting out their products."

That observation by Donald M. Vuchetich, vice president, CIMdata Inc. (Ann Arbor, MI) may be something of an understatement. Particularly the part about sorting things out. But the market analyst has some recommendations that can help. Overall, he advises, "The manager who is buying a system should look at and understand who the companies are that are investing in and developing the underlying technology." In his view, those companies tend to be software producers.

Vuchetich acknowledges that a highly visible trend in the CAE/CAD/CAM world is to switch from the big host computer-based systems to the 32-bit workstations and personal computers. One advantage of this, he says, is that software can work faster than before, and complex functions can be incorporated into the packages without performance deterioration. Today there is an array of modeling packages—3D, solid, finite element, parametric—that can be run on 32-bit machines with good performance.

**Cheap seats and high speeds.** There's another advantage to the PC/workstation boom. They are less expensive than host systems. "The cost of a CAE/CAD/CAM system has reached the level of most budgets, permitting department- and company-wide access to productive systems," Vuchetich observes. He says that workstation seats are available in the \$10,000 to \$20,000 range. Looking ahead, he comments, "Hardware will become more of a utility in the mechanical CAD/CAM world."

In Vuchetich's opinion, the people who are developing the software are driving CAE/CAD/CAM at higher

speeds than the people who are building the hardware packages to run this code on. "In fact," Vuchetich claims, "technology development is moving faster than its application. It's happening so fast that users are not able to take advantage of all the new products on the market. We expect this development to continue for many years."

There are three areas that he thinks prospective systems users should pay attention to. They are:

- Solids modeling. He says it first appeared in the '70s from Shape Data Ltd. (Cambridge, England and now a subsidiary of McDonnell Douglas

*Powerful software was once the domain of host computers. Now it can operate on workstations. Shown here is Automation Technology Products' CIMPLEX software running on the Personal IRIS workstation from Silicon Graphics (Mountain View, CA).*



**"Technology development is moving faster than its application—so fast that users are unable to take advantage of all the new products on the market," says CIMdata's Vuchetich.**

Manufacturing & Engineering Systems Co., St. Louis) and Matra Data-  
vision (Tewksbury, MA); the initial offering as a part of a CAD/CAM package was made in 1982 by Schlumberger CAD/CAM (Ann Arbor, MI; in 1982 it was Applicon). Vuchetich explains, "Solids modeling offers major improvements in product quality, and reductions in time to market by automating design and analysis, and providing checks to avoid such things as part interference."

- Surface modeling and Non-uniform Rational B-Splines (NURBS). These capabilities are generally available from vendors. The benefit: "Leading users are transferring their designs to tooling vendors as digital surface models, which eliminates errors and delays due to regenerating design data for the manufacturing applications," says Vuchetich.

- Form-feature modeling. Companies offering this capability include Schlumberger CAD/CAM, Automation Technology Products (ATP; Campbell, CA), and Parametric Technology (Waltham, MA). Observes Vuchetich, "CAE/CAD/CAM systems with form-feature capabilities are expected to improve product designs and make better use of a company's manufacturing capabilities, by designing features a company's machine tools can produce."

**Ones to watch.** According to Vuchetich, the major suppliers of mechanical CAE/CAD/CAM software systems are McDonnell Douglas,

### ***Estimated 1988 Software Revenue of the Top Five CAE/CAD/CAM Mechanical Software Vendors***

| (\$ millions)<br>(% of world market) |                      |                         |        |          |
|--------------------------------------|----------------------|-------------------------|--------|----------|
| Prime/<br>Computervision             | McDonnell<br>Douglas | Schlumberger<br>CAD/CAM | SDRC   | Dassault |
| \$180                                | \$53                 | \$50                    | \$48   | \$40     |
| (18.5%)                              | (5.5%)               | (5.2%)                  | (4.9%) | (4.1%)   |

Source: CIMdata

### ***Worldwide Mechanical CAE/CAD/CAM Software Market***

| (\$ millions) |        |        |        |        |
|---------------|--------|--------|--------|--------|
| 1988          | 1989   | 1990   | 1991   | 1992   |
| \$970         | \$1095 | \$1235 | \$1390 | \$1570 |

Source: CIMdata

Prime/Computervision (Bedford, MA), and Schlumberger CAD/CAM. In some instances they offer complete packages, hardware and software; in others, some of their products are available from hardware suppliers, notably Digital Equipment Corp. (Marlboro, MA) and IBM (White Plains, NY).

Vuchetich picks some companies he thinks prospective users might want to check out. These are:

- ATP for its CIMPLEX solids, form-feature modeling system for engineering and manufacturing.

- Autodesk Inc. (Sausalito, CA) for Auto Solids, a low-cost solids-modeling system that includes finite element and NC capabilities.

- Control Data Corp. (Minneapolis) for EMS/EDL, Sherpa Corp. (San Jose, CA) for DMS, and Intergraph Corp. (Huntsville, AL) for I/PDM, all of which are systems for product data management. These systems help connect engineering, material resource planning (MRP), and manufacturing systems.

- Parametric Technology for Pro/ENGINEER, its feature-based, parametric solids-modeling system for part and assembly designs.

- Schlumberger CAD/CAM for BRAVO3, a solids-modeling-based system packed with closely integrated capabilities for various tasks.

- Structural Dynamics Research Corp. (Milford, OH) for I-DEAS (and CAEDS on IBM hardware), an engineering design and analysis system combining capabilities including solids modeling, finite element, and kinematics.

Beyond the suggestions given here, Vuchetich offers some general tips. He recommends that when looking at systems, "Focus on the software. The tool that the designer and the engineer uses is the application software, not the hardware." Also with regard to software, he says customers should know who is providing it—and who will support the software after installation. Finally, "Avoid future promises. Focus on what the vendors can do today." [P]